FINAL PERFORMANCE REPORT

South Carolina State Wildlife Grant (T-49-R)

South Carolina Department of Natural Resources

October 1, 2008 – September 30, 2015

Project Title: Sea Turtle Conservation on Botany Bay

Objective 1:

To maintain management continuity on the Botany Bay beach by ensuring that scientifically approved methods are used during sea turtle nest protection activities and that data on nest incubation and hatching success are reliable. Activities include nest location/relocation, nest protection during incubation, genetic sample collection, post-emergence nest inventories, and visitor education.

Accomplishments:

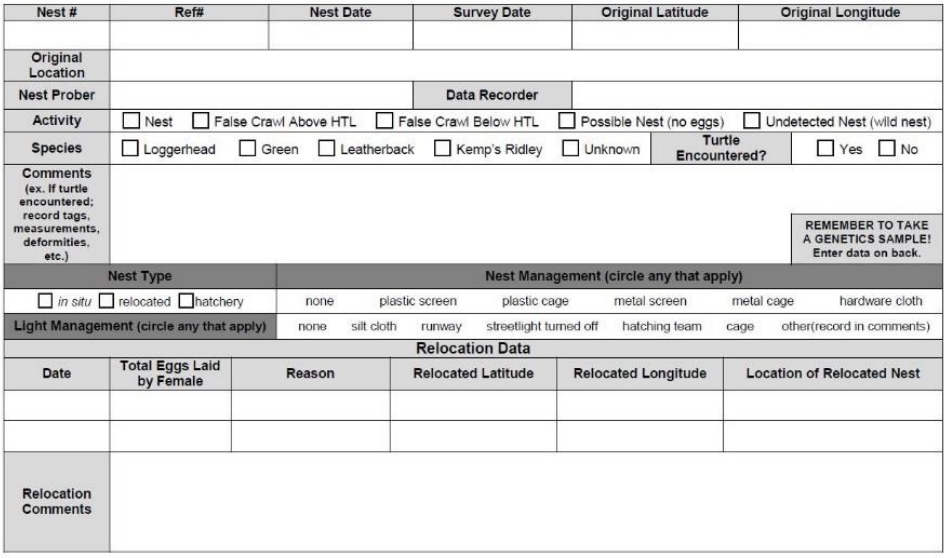
The Botany Bay beach consists of the Botany Bay Plantation Wildlife Management Area (the Plantation) acquired by SCDNR in January of 2008 and Botany Bay Island. Botany Bay Island is privately held but is no longer separated from the Plantation by South Creek. Both properties conducted limited sea turtle management activities in the past and efforts were inconsistent from year to year due to access and funding limitations. In the past, nesting surveys were conducted only a few days a week. With the acquisition of the Plantation by the State, funding became available for stewardship of the endangered and threatened sea turtles utilizing this beach. The turtle project became a standardized, seven day a week survey adhering to SCDNR Marine Turtle Conservation Program guidelines that could be carried out across both the Plantation and Island beaches.

With the acquisition of State Wildlife Grant funds, a seasonal technician was hired to manage sea turtle nest protection efforts on the beaches. Housing for the technician was provided by SCDNR at the Plantation. SCDNR biologists provided equipment, supplies, annual training and support to the technician. Sea turtle management activities were conducted each day during the season which ran from May through October. Staff made regular site visits to the property, and all equipment was maintained for the technician to use throughout the season. All-terrain vehicles (ATVs) were serviced at the end of the season in preparation for the upcoming year.

Beach patrols were completed seven days a week using ATVs for a majority of the beach. Some sensitive areas and areas where the ATV could not be utilized were walked to locate evidence of sea turtle nesting activities. The total survey area included the beach along the North Edisto River of Botany Bay Island to the southern end of Plantation boundary at Townsend Inlet. The front nesting beach of Interlude, south of Townsend Inlet, and Deveaux Banks were surveyed as time allowed (Figure 1).

Figure 1. Satellite view of Botany Bay Plantation Wildlife Management Area, Botany Bay Island, Interlude and Deveaux Banks.

Each turtle track was inspected to determine whether it was a "false crawl" or led to a nest. Location of each nest was determined using a GPS and recorded. All tracks were numbered and their locations recorded on nesting cards (Figure 2). All nest chambers were located with the use of a metal probe. If a nest was determined to be below the annual spring tide line, it was relocated to an area higher up the beach so that it would survive the incubation period. One egg was collected from each nest and placed in a marked vial for an ongoing regional genetics research project. If a nest suffered first night depredation, an empty shell was collected in lieu of an egg.



Nest #	Ref#	Nest Date	Survey Date	Original Latitude	Original Longitude

Original Location	
Nest Prober	Data Recorder
Activity	☐ Nest ☐ False Crawl Above HTL ☐ False Crawl Below HTL ☐ Possible Nest (no eggs) ☐ Undetected Nest (wild nest)
Species	☐ Loggerhead ☐ Green ☐ Leatherback ☐ Kemp's Ridley ☐ Unknown — Turtle Encountered? ☐ Yes ☐ No
Comments (ex. If turtle encountered; record tags, measurements, deformities, etc.)	REMEMBER TO TAKE A GENETICS SAMPLE! Enter data on back.

Nest Type	Nest Management (circle any that apply)
☐ *in situ* ☐ relocated ☐ hatchery	none plastic screen plastic cage metal screen metal cage hardware cloth
Light Management (circle any that apply)	none silt cloth runway streetlight turned off hatching team cage other(record in comments)

Relocation Data

Date	Total Eggs Laid by Female	Reason	Relocated Latitude	Relocated Longitude	Location of Relocated Nest

Relocation Comments	

Figure 2. Example of sea turtle nest field card utilized to record nesting data. Use of this field card allowed for standardization of data collection.

All nests were marked with a stake or pole color coded for every two weeks of the nest laying season. All nests were covered with plastic screening held down by stakes or buried metal caging to prevent predation by mammalian predators. Plastic screening was used in 2009 and a portion of 2010. Beginning midway through the 2010 season, the project began using the stronger metal cages to better protect turtle nests from predation.

Nests were visually checked throughout the incubation period to document disturbance (e.g. raccoon depredation, ghost crab depredation, or tidal inundation). After 45 days of incubation, nests were inspected daily for signs of emergence activity. Upon hatchling emergence, the nest was marked with flagging tape to indicate the nest hatched. Three days after emergence, an inventory of the nest contents was conducted to determine nesting success. All data was transcribed from the field cards to an online nesting database hosted on www.seaturtle.org. Please refer to Table 1 and 2 for a summary of the reproductive effort on Botany Bay Island and Botany Bay Plantation.

Year	Total Nests	Number Relocated	incubation duration	mean clutch count	hatch success	emergence success
2009	72	-	-	-	69.5	56.8
2010	97	12	53.7	109.7	76	72.9
2011	141	26	52.5	119.2	51.3	45.7
2012	136	25	60.8	111.5	45.2	45
2013	177	67	56.7	112.3	28.9	25.8
2014	55	15	57.7	109.3	36.2	31.7
2015	200	44	54.3	115.1	74.1	57.2

Table 1. Sea turtle reproductive success on Botany Bay Island from 2009 through 2015.

Year	Total Nests	Number Relocated	incubation duration	mean clutch count	hatch success	emergence success
2009	131	11	54.4	102.6	57.6	52.1
2010	176	114	52.6	118.3	62.3	57.7
2011	184	71	23.9	110.8	64	62.1
2012	271	48	58.6	110.6	77.3	76.4
2013	292	92	58.2	112.3	57.7	54.7
2014	103	21	56.5	115.8	60	56.3
2015	326	67	54.9	111.2	71.9	68.4

Table 2. Sea turtle reproductive success on Botany Bay Plantation from 2009 through 2015.

A hatching success of approximately 50% or higher was achieved for most years during the grant period on the Plantation. Restricted access and lack of permission to conduct predator management activities in certain years limited hatch success on Botany Bay Island.

The Botany Bay beach is considered a significant loggerhead nesting areas in South Carolina (Figures 3 and 4) hosting the second largest loggerhead sea turtle nesting aggregation in South Carolina behind the Cape Romain National Wildlife Refuge. The South Carolina rookery is a significant portion of the Northern Recovery Unit. This Recovery Unit is designated in the U.S. Fish and Wildlife Service's Recovery Plan for the Loggerhead Sea Turtle and encompasses North Carolina, South Carolina and Georgia.

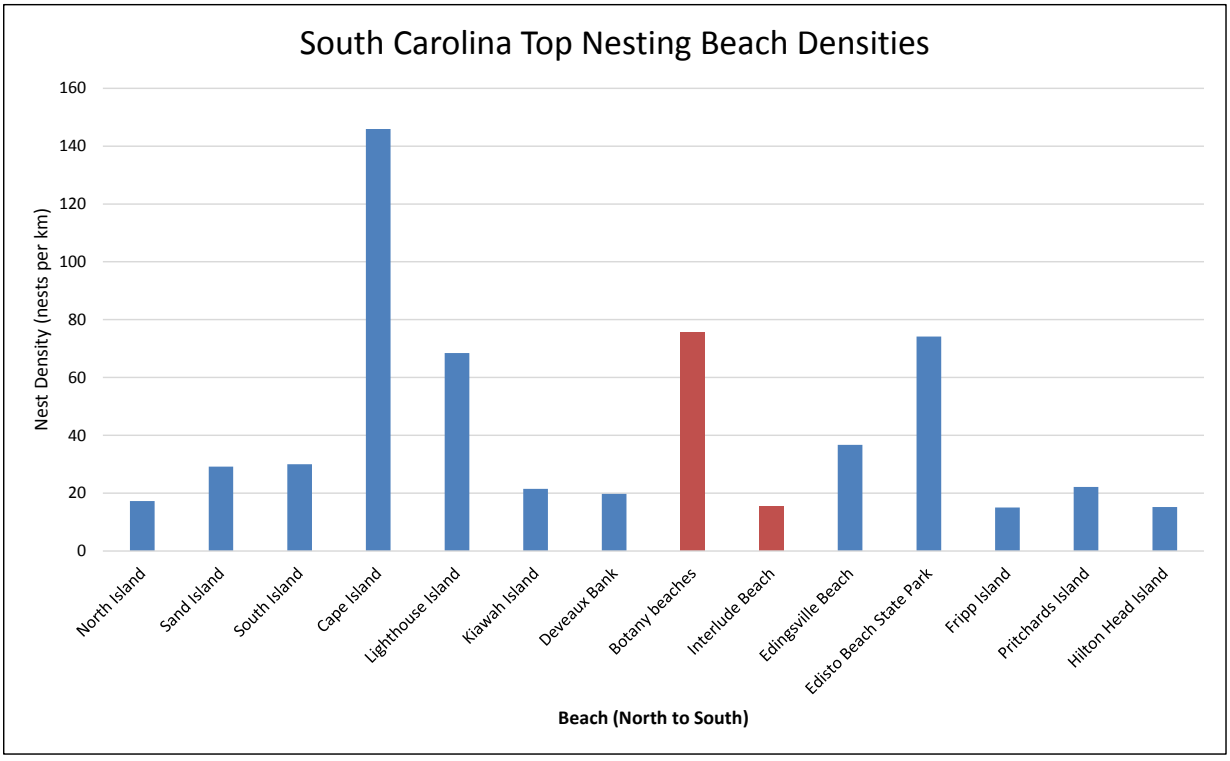


Figure 3: Top nesting beach densities in South Carolina listed geographically from the most northern beach to the most southern beach.

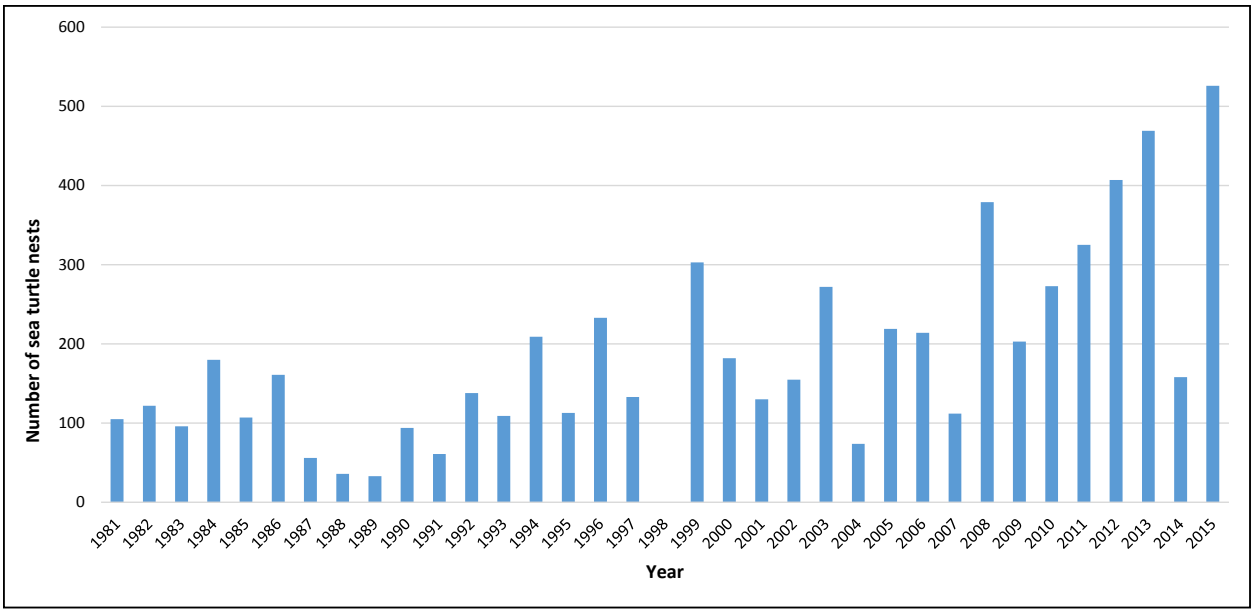


Figure 4. Number of sea turtle nests laid on Botany Bay Plantation and Botany Bay Island from 1981 to 2015. Nest management did not occur on either property in 1998. No nest management occurred on Plantation property from 1988-1991, thus numbers only represent the Island nests observed during those years.

Volunteer participation

A number of volunteers at the Plantation assisted the seasonal technician with sea turtle efforts on the Botany Bay beach. The technician organized a schedule and provided guidance and supervision to all individuals participating. Table 3 lists the hours and mileage provided by volunteers to the sea turtle project and indicates the community's involvement and support for the project on the Botany Bay beach.

Year	Hours	Miles
2009	709	-
2010	932	-
2011	316	4,846
2012	273	3,866
2013	704	5,008
2014	593	2,660
2015	1093	

Table 3. Volunteer hours and mileage contributed to the sea turtle project on Botany Bay beach during grant period.

Research

The turtle project on the Botany Bay beach participated in a multi-state genetics project determining maternal lineage of nests. This research involved the collection of a single egg or shell from each nest for analysis.

Educational outreach

The Botany Bay beach provided hands on educational opportunities for visitors to the ACE Basin. The turtle technician and beach volunteers spoke with individuals visiting the beach about the sea turtle project providing brochures if requested. A number of educational presentations along with nest protection demonstrations were given to the public (group participant number in parentheses if known). A small number of night time turtle walks were also conducted each year.

- 2009: Camp Wildwood (20); School groups affiliated with SC Aquarium, Spirit of South Carolina, Kiawah Island Nature Center
- 2010: Botany Bay Island homeowners; Boy Scout troops (40); Botany Bay Island home school group; School groups affiliated with SC Aquarium, Spirit of South Carolina, Kiawah Island Nature Center; Camp Wildwood (20)
- 2011: Botany Bay Island homeowners; Camp Wildwood (20)
- 2012: Ashley Hall Summer Science Camp (44); Boy Scout troop #70 (20); Boy Scout troop (20); Gullah Nation; SCDNR interns; Camp Wildwood (20); ABC News Channel 4
- 2013: Cub Scout troop #79 (40); SC ETV "Your Day" radio interview; Camp Wildwood (20); Halfmoon homeschooler group (40); Botany Bay Island homeowners; Ashley Hall elementary aged students (44)
- 2014: SCDNR Coastal Exploration Series group (25); Camp Wildwood (20); Cub Scout troop #79 (40); Botany Bay Island homeowners; College student intern; Edisto Island Land Trust Conservation Exchange (25); Northside Mission Group from Knoxville, TN (15)
- 2015: Camp Wildwood (20); Boy Scout Troop #646

Objective 2

To maintain continuity of data collected from sea turtle carcasses that strand on Botany Bay beach as part of a larger statewide and nationwide Sea Turtle Stranding and Salvage Network (STSSN). Live stranded sea turtles are to be transported to the SC Aquarium Sea Turtle Rescue Program.

Accomplishments: During the granting period, 17 turtles including 11 loggerheads (*Caretta caretta*), four Kemp's ridleys (*Lepidochelys kempii*), and two unknown turtles stranded on the Botany Bay beach (Figure 5). Level A data were collected on all strandings and provided to the SC STSSN Coordinator. One animal stranded alive and was transported to the SC Aquarium for medical care.

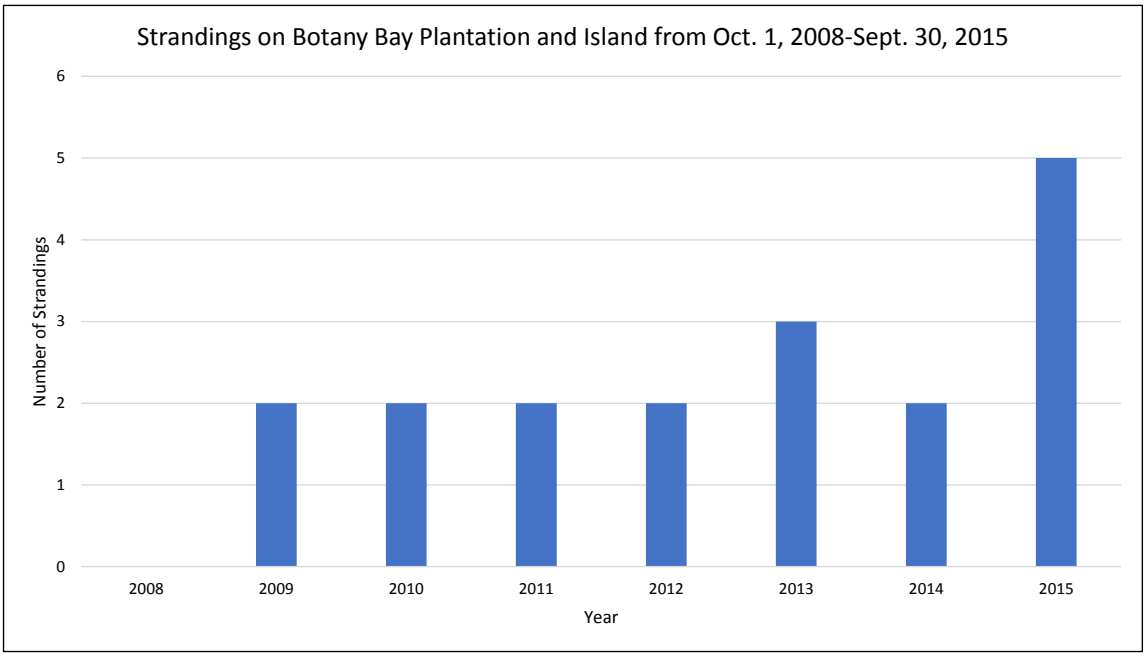


Figure 5. Number of sea turtle strandings on Botany Bay beach during grant period.

Objective 3
To conduct predator control as needed on an annual basis to protect sea turtle nests.

Accomplishments:
Raccoons are the primary mammalian predator to sea turtle nests on Botany Bay beach. The use of ecologically sound predator control programs are required in order to reduce the detrimental effects of nest depredation. The project seeks to achieve an annual nest predation rate equivalent to 10% or lower. Figure 6 shows the location of nests affected by raccoons during the granting period. Lethal removal of raccoons was conducted on one or both locations each year (Table 4). Access and permission to conduct trapping was not granted on the Island in 2011 and 2012. However trapping resumed in 2013 through 2015 though confined to a small portion of beach front only. In 2015, trapping efforts were extended to include the undeveloped adjoining Interlude beach to reduce predation on turtle nests in that area as well as intercept animals swimming over to the Botany Bay beach. Please see Table 5 for more specific information on mammalian (both raccoon and coyote) depredation events for each location during the years 2009- 2015.

Figure 6. Predation of sea turtle nests by mammalian predators on the Botany Bay beach during granting period, October 1, 2008 through September 30, 2015.

Trapping Date	Location	Animals Removed
May-September 2010	Island	25
December 2010	Plantation	15
January 2011	Plantation	14
February 2011	Plantation	4
February 2012	Plantation	17
September 2012	Plantation	47
October 2013	Island & Plantation	29
June 2014	Island & Plantation	12
May-June 2015	Island & Plantation & Interlude	60

Table 4. Raccoon trapping conducted on Botany Bay beach during the granting period, October 1, 2008 through September 30, 2015.

	Botany Island							Botany Bay Plantation						
Parameter	2009	2010	2011	2012	2013	2014	2015	2009	2010	2011	2012	2013	2014	2015
100% Depredation	1	8	2	56	86	20	0	1	12	2	13	40	17	3
Partial Depredation	3	12	2	3	44	7	2	7	29	12	3	41	10	14
Total # of Nests Depredated	4	20	4	59	130	27	2	8	41	14	16	81	27	17
Total # of Nests Laid	72	97	141	136	177	55	200	124	176	184	271	292	103	326
% of Nests Depredated	**6%**	**21%**	**3%**	**43%**	**73%**	**49%**	**1%**	**6%**	**23%**	**8%**	**6%**	**28%**	**26%**	**5%**

Table 5. Mammalian (raccoon and coyote) nest depredation data for Botany Bay Island and Plantation from 2009 to 2015.

Significant Deviations: None.

Estimated Federal Cost: Financial expenditures submitted under separate cover.

Recommendations: Close the grant.